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## Sea surface temperature: Differences between modeled and satellite-based observations of diurnal warming and their implications for air-sea interactions and climate feedbacks

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A key element of characterizing the climate system in greater detail is accurately capturing interactions between the ocean and atmosphere on multiple scales. Changes in heat and moisture fluxes across the air-sea interface can have profound influences on weather and climate variations. One factor influencing these fluxes that is not well captured in existing coupled models is diurnal variations of the sea surface temperature (SST). Improvements in the accuracy and the sampling of satellite sensors have enabled better characterization of diurnal variations in the SST (dSST). These can now be applied to assess how well existing models capture the amplitude and spatial scales of these warming events. In this work we utilize existing satellite SST products to compute the amplitude and spatial scales of diurnal warming events in two distinct geographic regions for comparison with model-based estimates. Through the Diurnal Variability Working Group of the Group for High-Resolution SST (GHRSST), unique datasets of collocated satellite SST observations and high resolution modeled wind and flux fields have been compiled for the Mediterranean Sea and the Tropical Pacific warm pool. The primary satellite SST products utilized in the aforementioned datasets are from geostationary orbiting sensors because of their ability to fully sample the diurnal cycle. Maps of satellite-retrieved diurnal warming events are presented and compared with corresponding dSST estimates computed from existing models for diurnal variability. These models range from simple parameterizations, to simplified numerical models such as the COARE warm layer model or Profiles in Ocean Surface Heating (POSH) model, to more detailed turbulence models. Each model is forced with the collocated numerical weather prediction- and reanalysis- derived wind and flux fields. Differences in amplitude and spatial extent of warming events are described as functions of model complexity and resolution of the forcing data. We conclude with a preliminary evaluation of the potential impact that the warming estimates and modeled minus observed dSST differences have on the derived air-sea heat flux.